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EXAMINER

CHANG, AUDREY Y

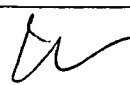
ART UNIT

PAPER NUMBER

2872

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/700,182	Applicant(s) FERDINAND ET AL. 	
	Examiner Audrey Y. Chang	Art Unit 2872	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 13-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 13-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Remark

- This Office Action is in response to applicant's amendment filed on **January 16, 2004**, which has been entered.
- By this amendment, the applicant has amended claims 14, 17, 19, 21-23 and 27.
- Claims 13-27 remain pending in this application.
- The **rejection** to claim 17 under 35 USC 112, first paragraph, set forth in the previous Office Action is **withdrawn** in response to applicant's amendment.

Response to Amendment

1. The amendment filed January 16, 2004 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: **claims 13, 17 and 21** have been amended to include the phrase "means for adjusting for *each of said writing* the position of said phase plate". The specification fails to support such adjustment of position of the phase plate is for "each writing". The specifications cited in the remark (page 10 of the remark) only gives support for moving the *grating*, i.e. changing the position of the grating in each writing, *not the phase plate*. Also **claims 19 and 27** recite the phrase "interferometric *means cooperating* with to said means for adjusting" that is not supported by the specification. The specification simply does not show the *cooperation* of the interferometry and the adjusting means. The specifications cited in the remark (remark page 9), completely fail to give the support of the cooperation cited.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it

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pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. **Claims 13-16, 17-19, 20, 21, 25 and 27 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The reasons for rejection based on the newly added matters are set forth in the paragraph above.

4. **Claims 13-16, 17-19, 20, 21 and 23-27 are rejected under 35 U.S.C. 112, first paragraph**, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims 13, 17 and 21 have been amended to include the feature of “with a phase plate having an adjustable position and orientation *for each of said writing*” and the feature of “means for adjusting *for each of said writing* the position of the said phase plate”. These phrases imply that the *phase plate* would be at either different position or would have different phase shift for *each writing*. Claims 13, 17 and 21 originally claim to write a **Bragg grating with an interference pattern** using a phase plate with a definite phase shift. Now it seems to suggest the writing of a **Bragg grating** may include *more than one writings* (each writing) with *more than one interference patterns* (since the position and orientation of the phase plate is adjustable for *each writing*), written in the substrate. The specification and the claims therefore fail to teach if the Bragg grating is written with one interference pattern or with **more than one** interference patterns, (if more than one how so because a grating is generally defined by one interference pattern).

The specification fails to teach how could the first interference pattern will have a *phase difference* of π over a second interference pattern (of the previously written Bragg grating) while **both** gratings or interference patterns are written using the **same phase plate**. It is not sure how does the phase

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difference of π being introduced into the writing process. **Furthermore, in claim 21**, the specification and the claim fail to teach how could the first interference pattern will have a π phase difference with respect to the second interference pattern while the second interference pattern is written with a phase plate having adjustable position and orientation for “*each of said writing*”. If the phase information is *adjusted for each writing* of writing the second interference pattern then the second interference pattern **will not** have a *fixed phase* and it would be *impossible* for the first interference pattern to have a fixed π phase difference with respect to the second interference pattern.

Clarifications are required.

Claim Objections

5. Claims 13-21 and 23-27 are objected to because of the following informalities:

(1) The phrase “a phase plate having an *adjustable* position and orientation *for each of said writing*” recited in the **amended** claims 13 and 21 is confusing and indefinite since it is not clear what is considered to be an “*adjustable position*” for *each writing*. Since it is not clear if for each writing the position of the phase plate is adjusted or that for each writing the phase plate has “adjustable position” (being more than one *possible* positions but not necessary being varied or adjusted). The applicant is respectfully reminded that having adjustable positions does not mean it has to be adjusted in position. The specification and the claims also fail to disclose what is the function of the adjustable position and orientation of the phase plate in relationship to the process of writing or erasing of a Bragg grating as recited in the earlier part of the claims.

(2) Claims 13, 17 and 21 have been **amended** to include the feature of “for each of said writing” which is confusing and indefinite since it is not clear if this suggests the Bragg grating is written with more than one writings or not, if so such features need to be explicitly stated.

(3) The phrase “according to an amplitude separation configuration” recited in claim 18 is confusing and indefinite since it is not clear WHAT is an amplitude separation configuration.

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(4) The phrase “according to a wave front separation configuration” recited in claim 19 is confusing and indefinite since it is not clear WHAT is a wave front separation configuration.

(5) Claim 21 is completely confusing and indefinite. The claim as it stands now does not give a logical and definite description for defining an workable process.

(6) The phrase “writing a third interference pattern in the substrate over the previously written Bragg grating” recited in claim 23 is confusing and indefinite since it is not clear how does this interference pattern relate to the first interference pattern. If the first interference pattern is to erase the previous written Bragg grating, then how can the third pattern is capable of being written on something has already been erased?

Appropriate correction is required.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. **Claims 13-14, 16, 17-18, 20, 21 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Inoue et al. (PN. 4,792,197) in view of the patent issued to Kashyap (PN. 6,307,679).**

Inoue et al teaches a *fabrication apparatus and method for writing a Bragg grating in a substrate* (15, Figure 4) wherein the apparatus comprises a *light source* for generating *two coherent light beams* of same *wavelength*. A *phase plate* (24) having *different phase shift regions* (please see Figure 5) is placed in one of the light beam path to create *sub-beam portions* that have different phase shift. The phase modulated sub-beam portions are interfered with the other light beam at the substrate to create an

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interference pattern that is recorded within the substrate as the *Bragg grating*, (please see columns 3-4). Inoue et al teaches that the phase plate may be placed at *different positions*, (21, 22 or 23), which suggests the plate may be displayed in translational sense. Inoue et al also teaches that the phase plate may be put at different angular positions (Figures 6a and 6b, notice the difference in angular orientation of the phase plate in relating to the optical axis of the light beam) to create different phase shift effects to the light beam and to reduce the possible grating degradation caused by the phase shift in the plate. This suggests that the position and the orientation of the phase plate are **adjustable**. It is further implicitly true that the phase plate **has** adjustable position and orientation for each writing to create desired phase shift and therefore desired interference pattern to be written as the Bragg grating in the substrate, since the phase plate is not fixed in the apparatus. Although this reference does not teach explicitly about a means for doing such adjustment, such feature is either inherently met or an obvious modification to one skilled in the art for the benefit of actually carrying out the adjustment. Also the position and angular orientation of the phase plate is adjusted as desired for **each recording or writing** of the Bragg grating as shown in Figures 5 and 6a and 6b, the adjustment therefore is possible for each writing.

Inoue et al teaches that the Bragg grating is formed on the substrate based on **photochemical reaction** of the substrate material induced by the interference pattern. It is implicitly true that photochemical process is a chemical reaction within the substrate material induced by the photo energy of the incident light of the interference pattern. A commonly known photochemical reaction is photopolymerization which polymerizes the substrate material by the imparting energy. The effect of the photochemical reaction therefore certainly will be within the substrate material. Also, in general, a Bragg grating is by definition a modulation of the refractive index of the substrate material. Inoue et al does not teach such *explicitly*. However, **Kashyap** in the same field of endeavor teaches an apparatus for writing Bragg grating using interferometric arrangement wherein a refractive index grating is formed, (please see Figure 1-2A). It would then have been obvious to one skilled in the art to apply the teachings of Kashyap

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to modify the grating of Inoue et al, mostly involving the selection of the substrate material, to be a refractive index grating for the benefit of providing an alternative grating material for the grating to be recorded.

With regard to claims 14 and 18, Inoue et al teaches that an *interferometric* arrangement including a beam splitter (12), as the separating plate, for dividing the main beam from the light source into the two coherent beams for creating interference pattern on the substrate and two mirrors (141 and 142) for conducting the coherent light beams to the substrate, (please see Figure 4).

With regard to claim 16, the phase plate (24) has spatially differed phase shift values wherein such phase shift will be imparted on one of the coherent light beam to make it contribute to the light beam in the wave function form as a conjugate variable with respect to the time variable.

With regard to claim 20, Inoue et al teaches that the phase plate introduces a phase shift of $\lambda/2$, which corresponds to a π phase difference, (please see column 3, lines 42-45).

With regard to claims 21, Kashyap teaches that a pre-written Bragg grating with no phase shift introduced to the recording beam (3a) may be formed within the optical fiber before recording the Bragg grating with phase shifting arrangement, (please see Figure 5 and columns 5-6). The newly recorded Bragg grating with phase shifting certain will overwrite certain part if not all of the prewritten Bragg grating. Kashyap also teaches that in recording an apodization grating, different interference patterns (for instance patterns 16 and 17, Figure 11) are written in superimposing fashion in the substrate, this implies that the phases of the two patterns will add to each other (i.e. superposition) and at the region wherein the two patterns are out of phase, patterns will cancel each other, i.e. one pattern will erase the other.

With regard to claim 25, Inoue et al teaches that the Bragg grating is used in a DFB laser which commonly utilizes an optical fiber grating. Kashyap teaches that the Bragg grating is formed in an optical fiber, (please see Figure 1).

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8. **Claims 15 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patents issued to Inoue et al and Kashyap ('679) as applied to claims 13 and 17 above, and further in view of the patent issued to Kashyap et al (PN. 5,377,288).**

The apparatus and method for fabricating a Bragg grating using interferometric arrangement as taught by Inoue et al in combination with the teachings of Kashyap ('679) as described for claims 13 and 17 above have met all the limitations of the claims. Inoue et al teaches the interferometric arrangement is using two mirrors however it does not teach that the interferometric arrangement may also be achieved by using a prism. *Kashyap et al* ('288) in the same field of endeavor teaches a method and apparatus for writing a refractive index grating wherein a **prism** (6, Figures 1, 2, and 5) is used as the interferometric arrangement for providing two coherent beams to interfere with each other on an optical fiber (2) in order to record the refractive index grating in the fiber. It would then have been obvious to one skilled in the art to apply the teachings of Kashyap et al to modify the apparatus of Inoue et al for the benefit of providing an alternative arrangement for creating the Bragg grating. With regard to the feature concerning the adjust means coupled to the interferometric arrangement, it is implicitly true that the adjustment of the phase plate is coupled to the interferometric arrangement in order to properly record the grating.

9. **Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Scalora et al (PN. 5,907,427) in view of the patent issued to Inoue et al.**

Scalora et al teaches a *Fabry Perot delay line* that is comprised of two successive fiber gratings (420 and 422, Figure 4A and column 11) interposed at two sides of a cavity. This reference however does not teach explicitly that the fiber gratings are formed by using interferometric arrangement with a phase plate. Inoue et al in the same field of endeavor teaches a *fabrication apparatus and method for writing a Bragg grating* in a *substrate* (15, Figure 4) wherein the apparatus comprises a *light source* for generating *two coherent light beams* of same wavelength. A *phase plate* (24) having *different phase shift regions*

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(please see Figure 5) is placed in one of the light beam path to create *sub-beam portions* that have different phase shift. The phase modulated sub-beam portions are interfered with the other light beam at the substrate to create an *interference pattern* that is recorded within the substrate as the *Bragg grating*, (please see columns 3-4). Inoue et al teaches that the phase plate may be placed at *different positions*, (21, 22 or 23), which suggests the plate may be displayed in translational sense. Inoue et al also teaches that the phase plate may be put at different angular positions (Figures 6a and 6b) to create different phase shift effects to the light beam. This suggests that the position and orientation of the phase plate are adjustable. It would then have been obvious to one skilled in the art to apply the teachings of Inoue et al to fabricate the fiber gratings of Scalora et al accordingly for the benefit of actually fabricating the fiber gratings with desired phase modulation therefore desired properties for the Fabry Perot delay line.

10. Claims 23, 24 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over the patent issued to Scalora et al in view of the patents issued to Inoue et al and Kashyap ('679).

Scalora et al teaches a Fabry Perot delay line that is comprised of two successive fiber gratings (420 and 422, Figure 4A and column 11) that are disposed at two sides of a cavity. This reference however does not teach explicitly that the fiber gratings are formed by using interferometric arrangement with a phase plate. Inoue et al in the same field of endeavor teaches a *fabrication apparatus and method for writing a Bragg grating in a substrate* (15, Figure 4) wherein the apparatus comprises a *light source* for generating *two coherent light beams* of same wavelength. A *phase plate* (24) having *different phase shift regions* (please see Figure 5) is placed in one of the light beam path to create *sub-beam portions* that have different phase shift. The phase modulated sub-beam portions are interfered with the other light beam at the substrate to create an *interference pattern* that is recorded within the substrate as the *Bragg grating*, (please see columns 3-4). Inoue et al teaches that the phase plate may be placed at *different positions*, (21, 22 or 23), which suggests the plate may be displayed in translational sense. Inoue et al

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also teaches that the phase plate may be put at different angular positions (Figures 6a and 6b) to create different phase shift effects to the light beam. This suggests that the position and orientation of the phase plate are adjustable. It would then have been obvious to one skilled in the art to apply the teachings of Inoue et al to fabricate the fiber gratings of Scalora et al according for the benefit of actually fabricating the fiber gratings with desired phase modulation and desired properties for the Fabry Perot delay line.

Both Scalora et al and Inoue et al reference do not teach about erasing a previously written Bragg grating. **Kashyap** teaches that a pre-written Bragg grating with no phase shift introduced to the recording beam (3a) may be formed within the optical fiber before recording the Bragg grating with phase shifting arrangement, (please see Figure 5 and columns 5-6). The newly recorded Bragg grating with phase shifting certainly will overwrite certain part if not all of the prewritten Bragg grating. Kashyap also teaches that in recording an apodization grating, different interference patterns (for instance patterns 16 and 17, Figure 11) are written in superimposing fashion in the substrate, this implies that the phases of the two patterns will add to each other (i.e. superposition) and at the region wherein the two patterns are out of phase, patterns will cancel each other, i.e. one pattern will erase the other. Also the capability of erasing a previously recorded grating is mainly based on the material of the recording medium. It is therefore generally true that the grating recording medium is capable of re-recording the grating by erasing the previous one for the benefit of allowing the medium to be reusable. It would also have been obvious to one skilled in the art to apply the teachings of Kashyap to modify the process of writing fiber Bragg grating for the benefit of creating grating with desired phase envelop such as apodization.

With regard to claim 24, Inoue et al does not teach explicitly that the adjustment of the phase plate is by programmable movement. However such modification is considered to be an obvious matter of design choice since to use programmable movement means is quite common in the art and such modification would have been obvious to one skilled in the art for the benefit of providing a better control for the adjustment.

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With regard to claim 26, Kashyap teaches that the refractive index grating operated as a Bragg grating is an apodized Bragg grating, (please see the abstract).

11. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over the patents issued to Inoue et al and Kashyap as applied to claim 17 above, and further in view of the patent issued to Cook et al (PN. 5,629,998).

The apparatus and method for fabricating a Bragg grating using interferometric arrangement as taught by Inoue et al in combination with the teachings of Kashyap as described for claim 17 above have met all the limitations of the claims. Inoue et al teaches the interferometric arrangement is using two mirrors however it does not teach that the interferometric arrangement may also be achieved by using a Lloyd's mirror. Cook et al in the same field of endeavor teaches a method and apparatus for writing refractive index grating in an optical fiber wherein an interferometric arrangement including the Lloyd's mirror is employed, (please see Figure 1 and columns 1-2). It would then have been obvious to one skilled in the art to apply the teachings of Cook et al to modify the apparatus of Inoue et al for the benefit of providing an alternative interferometric arrangement for recording the refractive index Bragg grating in the substrate.

Response to Arguments

12. Applicant's arguments filed on January 16, 2004 have been fully considered but they are not persuasive. The newly amended claims have been fully considered and they are rejected for the reasons stated above.

13. In response to applicant's argument, which states that the cited reference Inoue et al reference does not teach that the position and the orientation of the phase plate is adjusted for *each* of said writing of the grating, which therefore differs from the instant application, the examiner respectfully disagrees for the reasons stated below. Inoue et al reference teaches that the position and orientation of the phase plate

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may be altered or adjusted so that gratings of different phase modulation may be recorded. It is implicitly true that the phase plate implicitly **has potentially adjustable position and orientation**, since the plate is not fixed in any way in the Inoue et al apparatus. The amended features concerning the phase plate have adjustable position and orientation for each of said writing has been fully considered and addressed in the paragraphs above.

14. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., dynamic positioning) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

15. In response to applicant's arguments concerning claim 22, which are referred to applicant's arguments stated for claim 13, the examiner wishes to respectfully point out that the arguments set forth in claim 13 cannot be relied upon since the arguments concerning the phase plate has an adjustable position and orientation "*for each of said writing*" is not in the claim.

Conclusion

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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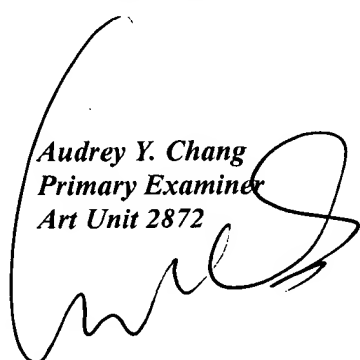
the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 571-272-2309. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Drew Dunn can be reached on 571-272-2312. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Audrey Y. Chang
Primary Examiner
Art Unit 2872



A. Chang, Ph.D.